

WHAT IS CLAIMED IS:

1. An information-processing apparatus comprising:
a nonvolatile memory device configured to store
firmware;

5 first means for issuing an instruction to an
operating system to make the operating system execute
a shutdown process, and to update the firmware, stored
in the nonvolatile memory device, after the operating
system has completed the shutdown process; and

10 second means, responsive to the instruction to
update the firmware, for updating the firmware after
the operating system has completed the shutdown
process.

2. The information-processing apparatus according to
15 claim 1, wherein the first means includes means for
issuing, to the operating system, a shutdown request
containing a request for updating the firmware, thereby
making the operating system issue the instruction to
update the firmware after the operating system has
20 completed the shutdown process.

3. The information-processing apparatus according to
claim 2, wherein;

the instruction to update the firmware supplied
from the operating system is included in a power
25 management event, which is issued from the operating
system to power off or reboot the information-
processing apparatus; and

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the second means includes means for powering off or rebooting the information-processing apparatus in response to the power management event, after the firmware has been updated.

- 5 4. The information-processing apparatus according to claim 2, wherein;

the shutdown request issuing means includes means for reporting, to the operating system, first address information indicative of a storage location of new
10 firmware to be written into the nonvolatile memory device; and

the second means includes means for reading the new firmware from a storage location indicated by second address information that is included in the
15 instruction to update the firmware supplied from the operating system, and writing the read new firmware into the nonvolatile memory device.

5. The information-processing apparatus according to claim 4, wherein;

20 the first address information reported to the operating system corresponds to a logical memory address; and

the second address information included in the instruction to update the firmware supplied from the
25 operating system corresponds to a physical memory address.

6. The information-processing apparatus according to

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claim 2, wherein;

the shutdown request issuing means includes means for reporting, to the operating system, first address information indicative of a storage location of an updating information package that contains new firmware to be written into the nonvolatile memory device and an updating-process program used to write the new firmware into the nonvolatile memory device; and

the second means includes means for calling for the updating-process program contained in the updating information package stored in a storage location that is indicated by second address information included in the instruction to update the firmware supplied from the operating system, thereby causing the updating-process program to execute an updating process for writing the new firmware of the updating information package into the nonvolatile memory device.

7. The information-processing apparatus according to claim 6, wherein;

the first address information reported to the operating system corresponds to a logical memory address; and

the second address information included in the instruction to update the firmware supplied from the operating system corresponds to a physical memory address.

8. The information-processing apparatus according to

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claim 1, wherein the firmware stored in the nonvolatile memory device is a BIOS program configured to control hardware of the information-processing apparatus.

9. The information-processing apparatus according to
5 claim 1, wherein the firmware stored in the nonvolatile memory device is a program to be executed by an MPU in a controller that is incorporated in the information-processing apparatus.

10. An information-processing apparatus capable of
10 executing various types of programs, comprising:

a nonvolatile memory device configured to store firmware;

first means for issuing, to an operating system,
a shutdown request containing a request for updating
15 the firmware, thereby making the operating system execute a shutdown process, and also causing the operating system to issue, after the operating system has completed the shutdown process, a power management event including an instruction to update the firmware
20 stored in the nonvolatile memory device and to power off or reboot the information-processing apparatus; and

second means, responsive to the power management event issued from the operating system, for executing a firmware-updating process to update the firmware
25 stored in the nonvolatile memory device thereby providing new firmware, and then powering off or rebooting the information-processing apparatus.

11. The information-processing apparatus according to claim 10, wherein;

the first means includes means for reporting,
to the operating system, first address information
5 indicative of a storage location of new firmware to be
written into the nonvolatile memory device; and

the second means includes means for reading new
firmware from a storage location indicated by second
address information that is included in the power
10 management event issued from the operating system, and
writing the read new firmware into the nonvolatile
memory device.

12. The information-processing apparatus according to claim 10, wherein;

15 the first means includes means for reporting,
to the operating system, first address information
indicative of a storage location of an updating
information package that contains new firmware to
be written into the nonvolatile memory device and
20 an updating-process program used to write the new
firmware into the nonvolatile memory device; and

the second means includes means for calling for
the updating-process program contained in the updating
information package stored in a storage location that
25 is indicated by second address information included in
the power management event from the operating system,
thereby causing the updating-process program to execute

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an updating process for writing the new firmware of the updating information package into the nonvolatile memory device.

13. An information-processing apparatus capable of
5 executing various types of programs, comprising:

a nonvolatile memory device configured to store firmware;

firmware-updating means for updating the firmware stored in the nonvolatile memory device; and

10 means for instructing, when updating the firmware, the firmware-updating means to update the firmware, using a power management event that is issued from an operating system being executed in the information-processing apparatus, the power management event
15 causing initiation and completion of a shutdown process, then an updating of the firmware and lastly a powering off or rebooting of the information processing system.

14. The information processing apparatus as recited in
20 claim 13, wherein said shutdown process closes down all active task including closing device drivers forming part of said information processing apparatus.

15. The information processing apparatus as recited in
25 claim 14, wherein said information processing apparatus includes a communication interface, a display controller, a display and an I/O controller and said shutdown process closes down said communication

interface, said display controller, said display and said I/O controller.

16. The information processing apparatus as recited in claim 15, wherein said information processing apparatus includes a central processing system, a main memory, a flash ROM, and power supply controller, and said shutdown process does not shut down said central processing system, said main memory, said flash ROM, and said power supply controller.

17. A firmware-updating method of updating firmware executed in an information-processing apparatus, comprising:

making an operating system execute a shutdown process, and issuing an instruction to update firmware stored in a nonvolatile memory device incorporated in the information-processing apparatus, after the operating system has completed the shutdown process; and

updating the firmware after the operating system has completed the shutdown process, in response to the instruction to update the firmware.

18. The firmware-updating method according to claim 17, wherein the issuing the instruction to update the firmware includes

issuing a shutdown request containing a request for updating the firmware, thereby making the operating system issue the instruction to update the firmware

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after the operating system has completed the shutdown process.

19. The firmware-updating method according to claim 18, wherein;

5 the instruction to update the firmware is included in a power management event, which is issued from the operating system to power off or reboot the information-processing apparatus, when the operating system has completed the shutdown process; and

10 the updating includes powering off or rebooting the information-processing apparatus in accordance with the power management event, after the firmware has been updated.

20. The firmware-updating method according to claim 18, wherein;

15 the issuing the shutdown request includes reporting, to the operating system, first address information indicative of a storage location of new firmware to be written into the nonvolatile memory device; and

20 the updating includes reading the new firmware from a storage location indicated by second address information that is included in the instruction to update the firmware supplied from the operating system, and writing the read new firmware into the nonvolatile memory device.

21. The firmware-updating method according to

claim 18, wherein;

the issuing the shutdown request includes
reporting, to the operating system, first address
information indicative of a storage location of
5 updating information package that contains new firmware
to be written into the nonvolatile memory device and an
updating-process program used to write the new firmware
into the nonvolatile memory device; and

the updating includes
10 calling for the updating-process program contained
in the updating information package stored in a storage
location that is indicated by second address
information included in the instruction to update the
firmware, thereby causing the updating-process program
15 to execute an updating process for writing the new
firmware of the updating information package into the
nonvolatile memory device.

22. A firmware-updating method of updating firmware
executed in an information-processing apparatus,
20 comprising:

issuing, to an operating system, a shutdown
request containing a request for updating the firmware
stored in a nonvolatile memory device provided in the
information-processing apparatus, thereby making the
25 operating system execute a shutdown process, and also
causing the operating system to issue, after the
operating system has completed the shutdown process,

a power management event as an instruction to update the firmware and to power off or reboot the information-processing apparatus; and

5 executing a firmware-updating process to update the firmware into new firmware, in response to the power management event issued from the operating system when the operating system has completed the shutdown process, and then powering off or rebooting the information-processing apparatus.

10 23. A firmware-updating method of updating firmware executed in an information-processing apparatus, comprising:

15 issuing, from an application program executed on an operating system to the operating system, a shutdown request containing a request for updating firmware stored in a nonvolatile memory device provided in the information-processing apparatus;

20 activating a firmware-updating program operable without the operating system, in response to a power management event as an instruction to update the firmware and to power off or reboot the information-processing apparatus, which is issued from the operating system after the operating system has completed a shutdown process; and

25 powering off or rebooting the information-processing apparatus after the firmware is updated using the firmware-updating program.

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24. A program stored in a storage medium and operable, when executed on a computer to cause said computer to execute a firmware-updating process for updating of firmware in the computer, said program causing said computer to perform the steps of:

receiving a firmware-updating request for updating the firmware, which is issued from an operating system when the operating system has executed a shutdown process on the computer; and

executing a firmware-updating process for updating, into new firmware, the firmware stored in a nonvolatile memory device provided in the computer, after the operating system has completed the shutdown process.

25. The program according to claim 24, wherein the firmware-updating request is included in a power management event issued, from the operating system when the operating system has completed the shutdown process, to power off or reboot the computer, and the program further operative to cause the computer to power off or reboot after completing the firmware-updating process.